DOCUMENT RESUME

ED 271 112 IR 051 548

TITLE The Changing System of Scholarly Communication.
INSTITUTION Association of Research Libraries, Washington, D.C.
PUB DATE Mar 86
NOTE 10p.
PUB TYPE Viewpoints (120)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Libraries; *Communication (Thought Transfer); Higher Education; Position Papers; *Research Libraries; *Scholarly Journals; *Scholarship; *Technological Advancement
IDENTIFIERS *Association of Research Libraries

ABSTRACT

The purposes of this paper are twofold: to present perceptions held within the research library community about changes taking place in the scholarly communication system and through the presentation of these views to stimulate dialog among the major participants in the system. The paper comprises five major sections. A section on the scholarly environment includes a definition of scholarly communication together with brief discussions of the influence of technology, elements of change, the rate of change, and the role of the library. A discussion of scholars addresses production quantity and the relationship between scholars and libraries. The section on publishers covers their role in scholarly communication, new technologies, costs, and growth. The section on the record of scholarship covers diversity of communication techniques and control of and access to information. The final section identifies users of the record of scholarship and briefly addresses mechanisms for the exchange of ideas, changing user behavior, impediments to the free flow of information, and the role of the Association of Research Libraries (ARL). (THC)

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The Changing System of Scholarly Communication

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THE CHANGING SYSTEM OF SCHOLARLY COMMUNICATION

The purposes of this paper are twofold. First, it is an attempt to present the perceptions held within the research library community about changes taking place in the scholarly communication system. Second, through the presentations of these views, it is the intention of the Association of Research Libraries to stimulate dialogue among the major participants in the system. Ultimately, we would hope to have a process of communication in place so that those involved can effectively address the issues we have identified, as well as others that might arise regarding the system of scholarly communication.

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THE CHANGING SYSTEM OF SCHOLARLY COMMUNICATION

ENVIRONMENT

Influence of Technology

Computing and telecommunications technology are causing revolutionary changes in society and its institutions. Extraordinary advances in microelectronics have fueled this information revolution, and scholarly communication and research libraries are changing rapidly and dramatically because of it as, indeed, are the needs of information users.

New technologies have enabled libraries to make substantial progress in resource sharing, co-operative collection development, coordination of preservation efforts, dispersed cataloging, and in the development of computerized scholars' work stations. Bibliographic utilities have enabled libraries to share records of their holdings, and protocols for linking systems and networks are under development.

In scores of research libraries, word processing systems and management information systems based on microcomputers have been installed to improve efficiency, microcomputer laboratories for library users are found in many libraries, database search services have expanded dramatically (despite fees for this service), and electronic mail systems are becoming commonplace. Computer technology has also facilitated the growth of selective dissemination of information services, and some libraries are actively providing document delivery services and experimenting with down-loading data to local computers for specialized information services. Recent developments in optical disk technology hold considerable promise for the storage of full texts and their retrieval on demand.

This developing technology has revealed a growing need for more specialized and technologically competent staffs on the one hand, and on the other the need for capital to acquire necessary equipment and software. Research libraries must at the same time preserve the retrospective record of scholarship entrusted to their care, and must continue to acquire book and journal collections during this period of transition, although even more selectively than in the past.

The new technology complicates decision making. Some research libraries may, during a period of limited funding and rapid innovations, follow a conservative course of action and resist the pressures of the technological imperative, others are experimenting enthusiastically. Whatever strategy is chosen for dealing with change, however, it cannot be denied that the system of scholarly communication—a system in which research libraries have for centuries played a pivotal role—appears to be changing radically.

Definition

For the purposes of this paper, scholarly communication is defined as the social phenomenon whereby intellectual and creative activity is transmitted from one scholar to another. As a system, its major components are the creators or authors of scholarly works, the ideas and knowledge that they create or interpret, the means by which they initially and informally communicate these "messages" to their colleagues (conference papers, preprints), the means by which such information is formally reviewed and communicated (editorial boards and publishers), the means for distributing and providing access to journals (paper copy subscriptions, microforms, electronic access), research libraries, and, finally, the consumers of this information (scholars and potential scholars). As the loop closes, the process continues in a self-generating mode to the extent that research tends to be cumulative: discoveries, once known, stimulate new discoveries.

Elements of Change

The various components of the system, however, are not as stable or static as the definition might suggest. First, technology has altered the influence traditionally enjoyed by various system components with the result that certain elements may not be essential to future scholarly communication systems. Second, economic considerations (including the job market for scholars in certain disciplines, the costs of publishing to the publishers and in some cases to the author, and fluctuations in rates of exchange) have also exercised considerable influence on the system as we have known it. Finally, the governments of countries influence the flow of scholarly communication through policy changes that affect access to information, changes in funding priorities for research, and by regulation or law.

Rate of Change

Only within the last quarter century has change in the scholarly communication system accelerated to the extent that it has begun to show serious stresses and strains. For the preceding 200 years, the system had remained essentially unchanged. The rise of academies and scholarly societies led to the development of the journal as a means of communicating information in a timely fashion. Libraries, in exercising their responsibilities to collect, preserve, and make available the records of scholarship and culture, played an important role in this system. As new disciplines were founded and new journals were published, the library's role became even more significant. As time passed, certain elements were added to the system, but the basic pattern remained essentially unchanged.

Since about 1960, however, the rate of change has been phenomenal. The information explosion found libraries financially unprepared to subscribe to the large numbers of journals that were being published. At the other side of the system, many scholars were caught in a highly competitive market in which "publish or perish" became the watchword. Despite the growing number of publishing avenues available, article submissions have exceeded capacity in many disciplines, with the result that referees have become overloaded and the period between article submission and publication has lengthened considerably. This phenomenon has in turn led to the publication of still more journals, adding to the inabilities of individual libraries to participate fully in the scholarly communication system.

Role of the Library

The research library's traditional role in scholarly communication has been to a large extent reactive. While libraries have built collections in anticipation of new needs, for the most part they have concentrated on collecting published works of scholarship within the contexts of constituent needs and budgetary limitations, have made them available for use locally and by means of interlibrary loan, and have sought to preserve these works. To the degree that they have succeeded in providing these services, they have played an important role in the scholarly communication process.

Research libraries serve as centers for both the production of research by scholars as well as the storage and retrieval of that knowledge by other scholars. Research libraries aggressively developed special collections that contributed to new collegiate programs, influenced curricula, and provided new research opportunities, while their decisions on priorities have enriched strong programs and, less often but quite sensibly, helped extinguish weak ones. They have also long worked for library cooperation far more zealously than their parent institutions have for program cooperation. The Association of Research Libraries, the Center for Research Libraries, regional research library organizations, the Research Libraries Group, OCLC, and others demonstrate that librarians are more acutely aware of the changing environment than are the scholarly communities they serve and to which they are accountable.

SCHOLARS

Production Quantity

The extraordinary growth in the number of active scholars over the past quarter century has seriously overloaded the traditional systems of scholarly communication. The flood of communication (research findings, analyses, interpretations, new theories) has affected quality control within various disciplines, increased the propensity to stake intellectual claims by rushing to publish, and has led in some fields to an emphasis on team research and multiple authorship.

Scholarly societies, in response to burgeoning memberships, have modified the format of their conferences to facilitate the delivery of large numbers of papers, instead of the few major ones that characterized conferences 25 or so years ago. The changing character of learned societies has resulted in many cases in the formation of secretariats and the introduction of more formal structures.

New technology is contributing directly and indiscriminately to the productivity of scholars, while indirectly adding to communications overload. The computer has simplified countless investigative processes and calculations, and has led to significant improvements in research methodology. It has, moreover, removed a good deal of the drudgery from research. A scholar sitting at a personal, multifunction workstation can easily manipulate large blocks of data or text; can store, test, and rapidly revise it through word processing systems; can have online access to bibliographic and informational databases; and can communicate with scholars on a worldwide basis.

Relationship of Scholars and Libraries

The external results of new technologies on the processes of scholarly research and communication are fairly obvious. But what is less clear is the extent to which these factors have changed the nature of scholarship within a discipline, and the implications of such change for research libraries. Has the growth of informal networks caused scholars to become less dependent on formal communication channels? If such a trend were substantiated, it might diminish the role of libraries in the process, even if only temporarily. At some institutions libraries are moving toward effective assimilation of current technology faster than the scholarly disciplines themselves.

Similarly, there is not much evidence that research libraries have become as closely involved with the scholars whom they serve as is desirable. It is interesting to note, however, that those health science libraries that have established clinical librarian positions are succeeding in bridging the gap between health science practitioners and library resources. Perhaps this model might benefit other disciplines as well.

PUBLISHERS

Role

Publishers play a major role in the process of scholarly communication. To a large extent, they, along with referee panels and editorial board, exercise a gatekeeping function with respect to what is entered into the "record" of scholarship. Publishers include not only organizations (commercial, academic, governmental, and private) that publish scholarly books, journals, and other paper documents, but also those engaged in electronic publishing, in developing databases or electronic access, and in issuing reports and data wholly or in part in microform.

Technology

The development of new technologies has affected the producers of scholarly information, and the publishing industry as well. Publishers are now able to set type electronically, accept manuscripts on disks rather than paper, and "publish" electronic journals. Technology also has prompted the development of on-demand publishing services. Developments in telecommunications have produced networks that will permit the transfer of information in any format: video, videotext, audio, computer.

In view of the significance and rapidity of the changes affecting publishers, it is likely that our very conceptions of publishers will be challenged. Lines of demarcation between publishers, information service companies, and hardware manufacturers are already becoming blurred.

Costs

The role of publishers in the scholarly communication process has also been affected by economic forces. It is widely perceived that within the U.S. and Canada, the costs of publishing have risen significantly in recent times, and that this trend increasingly has caused publishers to refuse to accept quality works perceived to have a limited market, to require authors to pay page charges to assist in covering publishing costs, and to require subvention grants for scholarly books. Journal publishers have typically charged higher subscription rates to libraries on the premise that library copies are likely to be read by more people than subscriptions sold to individuals.

In recent years fluctuations in foreign exchange rates have enhanced the purchasing power of U.S. libraries while seriously weakening the ability of foreign libraries to acquire materials published in the U.S. Also, some foreign publishers have sought to capitalize on the strong dollar by requiring U.S. libraries to pay in dollars rather than at prevailing exchange rates.

Growth

Another phenomenon affecting publisher performance with the scholarly communication process is the growth in manuscript submissions. This growth is a function both of the increasing number of active scholars and of their need to attain recognition through publishing. The flood of manuscripts has severely strained the system of refereeing and editorial review, with the result that some articles which contribute substantively to scholarship are not being published (at least not in a timely manner).

The growth of knowledge combined with the increasing numbers of active scholars has led to the formation of new disciplines, sub-disciplines, and interdisciplinary groupings. Members of these groups have established highly specialized journals to facilitate communication among themselves, or have persuaded commercial publishers to issue journals for them. While it can be persuasively argued that a good deal of such fractional publishing is unnecessary and that existing communication channels might handle this output, the fact remains that many narrow-focus journals appear to be successful both economically and as conveyors of new information.

THE RECORD OF SCHOLARSHIP

Diversity

The records of scholarship may be published or unpublished. The latter include raw data, archives, and manuscripts. Historically, research libraries have been viewed as having a virtually unchallenged role with respect to published materials. The crisis that libraries will face first is more in the areas of unpublished and pre-published scholarship. The ability to acquire and store electronic information that can be changed and erased, for example, may also be a critical problem for scholarship of the future. The definition of "published" is becoming unclear.

The message that is communicated by scholars is the record of their work. This message is often communicated informally among members through invisible colleges before it reaches the more formal channels of communication (conference proceedings, journal articles, published research reports, and books) thus creating problems of information overload for consumers. This has strained the capacity of established channels to carry the load. Furthermore, increasing specialization, most notably in the sciences, has dispersed relevant literature.

These problems can adversely affect scholarly access to relevant information. Abstracting, indexing, and cataloging systems sometimes fail to describe documents adequately, thereby limiting their bibliographic accessibility. Weaknesses or limitations in bibliographic systems often result in curtailed physical access.

Control and Access

Good progress, however, has been made with respect to information storage, e.g., miniaturization through microforms, and high density storage on magnetic disks, tape, and optical disks. Compact shelving systems have enabled libraries to store paper documents more efficiently. Although paper is a somewhat fragile medium, significant advances have been made in extending the lifespan of books and journals. Transferring information to microforms and optical disks for archival purposes is expected to contribute significantly to the preservation of content, though only time will tell if these media are more durable than paper.

While individual scholars typically maintain their own personal libraries and subscribe to journals important to their disciplines, research libraries traditionally have had the dominant roles of preserving the record of scholarship for use by future scholars, and providing access to this record. A number of observers have noted that these objectives may conflict on occasion, but for the most part research libraries have succeeded in balancing these responsibilities.

New technologies have been employed to improve substantially bibliographic access to research materials. The computer has been the key to the formation of state and regional information networks and national bibliographic utilities. Advances in telecommunications now enable scholars to search local data files, library catalogs that have been converted to machine-readable form, abstracting and indexing services, and other online sources from their homes or offices using personal computers.

The proliferation of databases (many owned by private corporations) containing bibliographic records has also created access problems for scholars and libraries. It is desirable and feasible, from a technological viewpoint, to link these systems and provide electronic gateways from one to another. This is a matter of considerable importance to research libraries, and is already being studied and addressed.

Despite the strides being made to preserve the record of scholarship and to enhance its bibliographic accessibility, only limited progress has been made in facilitating physical access to documents in their hard-copy form. Existing book and journal collections will no doubt need to be maintained and developed for years, and this responsibility will weigh heavily on those research libraries holding collections of national or international significance. The challenge facing these libraries is how to respond to the present demands of scholars for information in traditional formats while they attempt to position themselves to participate effectively in future systems of scholarly communication.

USERS OF THE RECORD OF SCHOLARSHIP

Mechanisms for Exchange of Ideas

The exchange of ideas is fundamental to the nature of scholarship. Operating as a community, those actively involved in research are often members of informal information networks through which relevant information is easily shared. Those at the forefront of their disciplines may receive most of the information they need in this fashion (that is, by means of pre-prints, conference calls, letters, or electronic mail). But for the majority of scholars, the journal (whether in paper, micro, or electronic form) continues to be a major medium of scholarly communication. It not only functions as a repository of completed work, but also is consulted by practitioners to learn of works in progress.

Changing User Behavior

While there has been some research on the information-seeking behavior of scientists and certain other scholars on the one hand, and the use made of research libraries on the other, a unified theory of consumer behavior with respect to the "published" record of scholarship has not been developed. Consequently, there are a number of questions concerning the relationship between scholars and research libraries for which there are no empirically validated answers. To what extent are scholars becoming more sophisticated in manipulating information systems to meet their needs? Is the role of the librarian as mediator between the scholar and the information system declining? As advances in computerization and telecommunications decentralize large files and enhance user access and convenience, scholars have more options for access to information than those traditionally provided by research libraries.

Impediments

While significant changes are occurring in the ways in which scholars approach the system of scholarly communication, other environmental factors in the areas of law, government, and even institutional policy have the potential for adversely affecting the free flow of information.

Numerous articles have already explained the concern of publishers with regard to efforts on the part of research libraries to formalize schemes for resource sharing. For example, the proposal for a National Periodicals Center produced publishers' opposition to such systems. They claim that resource sharing on such a scale is not legal under the revised Copyright Law. Authors, on the other hand, have been impressed with the success in England of the Public Lending Act, under which libraries pay royalties to authors based upon the number of uses made of their works. Both of these issues are of major concern to research libraries: a more rigid interpretation of the fair use provisions of the Copyright Law, and the passage of a version of a public lending act in the U.S. would seem to inhibit the free flow of ideas and therefore would not be in the best interests of libraries and their users.

Changes in government policy and funding priorities also may impede seriously the flow of scholarly information. Increasingly, federal agencies are demanding review of sponsored research before it is published. An alarming trend is the dissemination of government information through commercial publishers rather than the Government Printing Office or other agencies. Similarly, in a federal cost-saving effort, the interlibrary loan of records held by the National Archives has been drastically curtailed. A further threat is posed by the issuance of an Office of Management and Budget circular on federal information management which will sharply inhibit public access to government information.

Looking at the individual's side of the equation, concepts of privacy, security, and intellectual property are being reshaped. New laws will need to be formulated to address these issues, which when passed will likely have a major impact on scholarly communication.

Role of ARL

Because libraries historically have borne the responsibility of providing users with the records of scholarship, it is assumed that ARL will continue to serve as a clearinghouse for information and experimentation on library services to scholars, on repackaging information for special clientele groups, and on monitoring governmental policies and action affecting the flow of scholarly information (as well as its ownership, availability, and price).

Strengthening the effectiveness of research library participation in the system of scholarly communication is a responsibility ARL cannot, in conscience, avoid nor will it. The amorphousness and rapid evolution of the contemporary system make any attempts to influence or guide it difficult, but not impossible. ARL will align itself aggressively with other system participants to help guide development of the international scholarly communication system in the interests of scholarship.

March 1986

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